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On Mountin Sculpture in the Sierra Nevada, and the Method of Glacial Erosion.

Ezra S. Carr

The heated layer was then placed at such an angle that the reflected portion of the sound-wave was sent through a second tin tube (of the same dimensions as the above), and its action rendered visible by its causing a second sensitive flame, placed at the end of the tube, to become violently affected. This action continued as long as the heated layer intervened; but upon its withdrawal, the first mentioned sensitive flame, receiving the whole of the direct noise, became again violently agitated, and at the same moment the second sensitive flame, ceasing to be affected, returned to its former tranquility.—*Nature*, ix, 334. E. C. P.

II. Geology and Natural History.

1. *On Mountain Sculpture in the Sierra Nevada, and the method of glacial erosion;* by E S. Carr.—After speaking of the divisional planes in the granites of the Sierra Nevada, Prof. Carr remarks as follows.—The greatest check to the free play and controlling power of these divisional planes is the occurrence, in immense numbers and size, of domes, cones, and round wave-ridges, together with an innumerable brood of modified forms and combinations. The curved cleavage which measures and determines these rounded forms may be designated *the dome cleavage*, inasmuch as the dome is apparently the most perfect typical form of the group.

Domes of close-grained siliceous granite are admirably calculated to withstand the action of atmospheric and mechanical forces. No other rock-form can compare with it in strength; no other offered so unflinching a resistance to the tremendous pressure of the glaciers. A dam of noble domes extends across the head of Yosemite Valley, from Mount Starr-King to North Dome, which was effectually broken through by the combined force of the Hoffman and Tenaya glaciers; but the great South Lyell glacier, which entered the valley between Starr King and Half Dome, was unable to force the mighty barrier, and the approach of the long summer which terminated the glacial epoch found it still mazing and swedging compliantly among the strong unflinching bosses, just as the winds are compelled to do at the present time.

The Starr-King group of domes is perhaps the most interesting of the Merced basin. The beautiful conoid, Starr King, the loftiest and most perfect of the group, was one of the first to emerge from the Glacial sea. * * *

There appear to be no positive limits to the extent of dome structure in the granites of the Sierra, when considered in all its numerous modifications. Rudimentary domes exist everywhere, waiting their development, to as great a depth as observation can reach. The western flank was formerly covered with slates, which have evidently been carried off by glacial denudation from the middle and upper regions; small patches existing on the summits and spurs of the Hoffman and Merced Mountains are all that are now left. When a depth of two or three thousand feet below the

bottom of the slates is reached, the dome structure prevails almost to the exclusion of others. As we proceed southward or northward along the chain from the region adjacent to Yosemite Valley, dome forms gradually become less perfect. * * *

Glacial erosion.—No matter how abundant the glacial force, *a vertical precipice can not be produced unless its cleavage be vertical*, nor a dome without dome structure in the rock acted upon. Therefore, when we say that the glacial ice-sheet and separate glaciers *molded* the mountains, we must remember that their molding power upon *hard granite possessing a strong physical structure* is comparatively slight. In such hard, strongly built granite regions, *glaciers do not so much mold and shape* as *disinter forms already conceived and ripe.* The harder the rock, and the better its specialized cleavage planes are developed, the greater will be the degree of controlling power possessed by it over its own forms, as compared with that of the disinterring glacier; and the softer the rock and more generally developed its cleavage planes, the less able will it be to resist ice action and maintain its own forms. In general, the *grain of a rock determines its surface forms;* yet it would matter but little what the grain might be—straight, curved, or knotty—if the excavating and sculpturing tool were sharp, because in that case it would cut without reference to the grain. Every carpenter knows that only a dull tool will follow the grain of wood. Such a tool is the glacier, gliding with tremendous pressure past splitting precipices and smooth-swelling domes, flexible as the wind, yet hard-tempered as steel. Mighty as its effects appear to us, it has only developed the predestined forms of mountain beauty which were ready and waiting to receive the baptism of light.—*Overland Monthly*, May, 1874.

2. *Note on the recent Volcanic Action in Hawaii;* by T. Coan, from a letter to J. D. Dana, dated Hilo, Hawaii, Jan. 6th, 1874.—You are aware that the great summit crater of Mauna Loa, Mokuaweoweo, has, for a number of years, shown but few and feeble symptoms of activity, until the past year. For a few days in August, 1872, there was a brilliant light in the crater; and again on the 6th and 7th of Jan., 1873, there were vivid demonstrations, which roused the attention of many witnesses. But it was not until the 20th of April, 1873, that a continuous exhibition of mountain pyrotechnics commenced. From that day to the present, now almost nine months, the action within the great cauldron has not remitted. Most of the time the boiling has been vehement, and the scene was never more brilliant than a few nights ago. Sustained jets of molten-rock were constantly rising 50 to 200 feet within the mural caldron, and the surgings, puffings and roarings have been heard low down the sides of the mountain, and, as some testify, as far as Reed's Ranch, probably fifteen miles.

But the great marvel of this eruption is its *duration.* We have seen nothing like it before in this crater. The eruption of 1855–6